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WHAT'S DIFFERENT ABOUT SOCIAL MEDIA NETWORKS? A FRAMEWORK AND RESEARCH AGENDA[1]

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In recent years, we have witnessed the rapid proliferation and widespread adoption of a new class of information technologies, commonly known as social media. Researchers often rely on social network analysis (SNA) when attempting to understand these technologies, often without considering how the novel capabilities of social media platforms might affect the underlying theories of SNA, which were developed primarily through studies of offline social networks. This article outlines several key differences between traditional offline social networks and online social media networks by juxtaposing an established typology of social network research with a well-regarded definition of social media platforms that articulates four key features. The results show that at four major points of intersection, social media has considerable theoretical implications for SNA. In exploring these points of intersection, this study outlines a series of theoretically distinct research questions for SNA in social media contexts. These points of intersection offer considerable opportunities for researchers to investigate the theoretical implications introduced by social media and lay the groundwork for a robust social media agenda potentially spanning multiple disciplines.

Keywords: Social media, social network analysis, theory, blog, wiki, networks, framework, research agenda, knowledge management

Introduction

In recent years, we have witnessed the rapid proliferation of a new class of information technologies, commonly known as social media, which support interpersonal communication and collaboration using Internet-based platforms. Among the best known of these tools are sites such as Facebook, LinkedIn, and Twitter, each of which are used by hundreds of millions of people as of this writing. Despite the popular adoption of social media, their application for organizational purposes, including marketing and knowledge management, has only just begun. Although only 18 percent of managers believe that social media is important for their business today, more than 63 percent assert they will be important for business within three years (Kiron et al. 2012). McKinsey estimates that the economic impact of social media on business could exceed $1 trillion, most of which is gained from more efficient communication and collaboration within and across

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organizations (Chui et al. 2012). The impact of social media on and for organizations, therefore, represents an important area for information systems research.

How these new technologies will impact organizations, however, is not entirely clear, and identifying the theoretical implications of social media technologies for organizational research is challenging. Part of this challenge is technological: It is difficult to articulate clearly which technologies are "social media" and which are not. The broad term has been used to apply to a variety of technologies, including wikis, blogs, microblogs, social networking sites, virtual worlds, and video-sharing sites—to name a few (Kaplan and Haenlein 2010). The technologies also are evolving rapidly, introducing new features and often blurring the distinctions among different types of social media technologies. It is often difficult to clarify what is technologically distinctive about social media technologies, because they share many characteristics of prior collaborative technologies, such as USENET (Butler 2001), group decision support systems (DeSanctis and Poole 1994), or knowledge management systems (Alavi and Leidner 2001).

Part of this challenge is also behavioral. Even though many of the technological distinctions enacted by social media may only be a matter of degree, the rapid adoption and widespread use of these tools mean that even relatively minor technological differences may result in profound theoretical consequences for individual and organizational behavior. Many managerial challenges associated with applications of social media are consistent with those long recognized by the IS discipline (Kane et al. 2010), and existing theoretical perspectives will be useful for addressing these challenges raised by social media. On the other hand, these new tools also provide users, managers, and developers with the capabilities that allow them to act and interact with each other in novel ways that are difficult or were impossible to do in earlier online or offline settings. These novel capabilities may undermine or violate the assumptions of established theory, potentially requiring researchers to adapt these theories for application to social media settings or possibly develop new ones (Majchrzak 2009).

With this article, we seek to outline a set of theoretically distinct questions raised by the introduction of social media in and by organizations to formulate a research agenda. To overcome the challenges associated with treating social media as an integrated and entirely novel class of technologies, we instead focus on a set of key social media features. We update a widely used definition of social networking sites (SNS; boyd and Ellison 2007; Ellison and boyd 2013) to highlight four features shared by many social media technologies: digital profile, relational ties, search and privacy, and network transparency. To narrow the set of possible theoretical implications, we focus specifically on the implications of these features for one paradigm of organizational research: social network analysis (SNA) (Borgatti and Foster 2003; Contractor et al. 2006; Kilduff et al. 2006). SNA has enjoyed increasing popularity in organizational research during recent years, and its focus on human social interactions makes it well suited to support investigations of social media technologies (Ransbotham et al. 2012; Wattal et al. 2010).

Exploring the implications of social media for social network analysis is a fruitful place to begin theorizing the unique implications of social media for organizations. The four features of social media we examine in this paper introduce opportunities and capabilities not available in traditional online or offline social networks and infuse them with meanings that differ from those of more traditional networks. We pursue two fundamental objectives in this article. First, we apply a typology of social network research developed by Borgatti and Foster (2003) to the four key features of social media networks identified by boyd and Ellison (2007). The result is a framework for beginning to think about the unique implications of social media for organizational theory. Second, this framework highlights four key points of intersection that represent important differences between traditional social network research and social media, highlighting novel areas of inquiry for IS researchers. We conclude by posing several distinct questions for future research at each of these points of intersection. The result is a theoretically grounded agenda for social media research that we hope will both inspire researchers to investigate these questions as well as provide a reference to facilitate publication of social media research across multiple disciplines.

Tenets of Traditional Social Network Research

Social network analysis has appeared in the social sciences for nearly a century (Borgatti et al. 2009). What makes SNA unique, at least among the social sciences, is its reliance on the network as its central construct. A network is a set of nodes interrelated by dyadic ties. The nodes, or actors, can consist of any kind of entity, from individuals to collectives (e.g., organizations, countries). Ties typically are conceptualized as a social relation, such as "friend of" or "boss of," or a dyadic interaction, such as "talks to" or "sells to." Furthermore, the set of ties that link nodes is not independent; rather, ties link up to form paths, which provides a mechanism for nodes to affect one another indirectly. The system of paths in

turn forms a structure, in which each node occupies a particular position. A fundamental tenet of SNA is that a node's position in a network structure helps determine the opportunities and constraints it will encounter.

Even with its long history, the use of SNA in organizational research has increased exponentially in recent years (Borgatti and Foster 2003). For example, in the IS discipline, special issues of top journals have dealt with relevant applications of SNA (Agarwal et al. 2008; Oinas-Kukkonen et al. 2010). Contemporary research on both interpersonal (Borgatti et al. 2009; Brass et al. 2004; Burt 2000; Contractor et al. 2006) and information technology-enabled (Alavi and Kane 2008; Fulk 1993; Hiltz and Turoff 1993; Rice and Love 1987) social networks offers a diverse repertoire of theories and frameworks to describe, analyze, and explain the behaviors that emerge in this new generation of social media-enabled networks (Monge and Contractor 2003).

In a review of social network literature, Borgatti and Foster (2003) attempt to bring order to this diversity by providing a framework for understanding social network research according to two axes: explanatory goals (social homogeneity or performance variation) and explanatory mechanisms (network content or structure). Their resulting 2 × 2 framework describes the four "canonical" types of social network research (see Table 1).

1. *Environmental shaping*: how the network environment exerts a predictable influence on its members.

2. *Contagion*: how resources spread through a network and influence nodes.

3. *Stuctural capital*: how particular structures of individuals' relationships benefit or constrain them.

4. *Resource access*: how nodes access and benefit from resources available in the network.

Explanatory Mechanisms: Content Versus Structure

Social networks are vital precisely because no man is an island. We all need resources and support from others (i.e., social capital) to live and thrive (e.g., Boxman et al. 1991). Researchers attempt to explain the value of social networks by looking to the content that flows through the networks or the structure of the networks and the resulting ability to reach or control important resources. Content refers to resources available in a network (e.g., information, gossip, money, disease); structure refers to identifiable patterns of nodes and ties in a network.

Some researchers further argue that the nature of content flows (e.g., whether the right resources are available in the network) determines the value of a social network (e.g., Lin 1999). The actual content that members exchange creates a web of cooperative relationships that breed norms, trust, common purpose, and coordination—that is, social capital (e.g., Brehm and Rahn 1997; Coleman 1988; Fukuyama 1995; Putnam 1995). For example, gift exchanges can facilitate the development of social capital in an organization or network (Dolfsma et al. 2009). Different types of content vary in their movement through networks (Borgatti 2005). In a social media context, network content is the digital content contributed by users, which may provide information, influence, or social support (Butler 2001). Digital content flows through networks differently than other types of content; a physical object moving through a network occupies only one place at a time, whereas digital resources can be copied, manipulated, aggregated, and searched. While digital content is consistent with SNA, its distinctive characteristics might mean that research on social media networks needs a specialized subset of measures and theories, with adaptations from traditional social network research.

Other researchers contrast this content approach with a focus on the exploitability of certain features of the network's structure or topology, such as the abundance of structural holes (i.e., lack of ties between members in a node's personal network) (Burt 2000), which may be the primary source of benefits in a network. Network researchers offer a vast array of metrics to describe network structures (Scott 2000; Wasserman and Faust 1994). Because ties represent relationships or interactions, they can be difficult to observe and quantify in traditional social networks. Social media platforms quantify or formalize relationships or interactions between nodes by explicitly representing them in a formal data structure, operating on a computerized platform. This formalization provides relational capabilities in social media networks that are not present in offline social networks, including the ease of visualizing and analyzing the connections. However, the relational formalism of social media platforms also limits relational capabilities, such as by limiting the amount of nuance people can attribute to labels such as "friend" or "follower" (Gilbert and Karahalios 2009). If people are limited to establishing similar formal connections with diverse sets of others including trusted confidants, casual acquaintances, and family members in their social networks, the platform homogenizes all of these relational connections as being equivalent (e.g., friends, contacts). Thus, while traditional SNA knows what ties mean but has difficulty eliciting these social data and

Table 1. Canonical Social Network Research (Borgatti and Foster 2003)

Explanatory Goals	Explanatory Mechanisms		
		Structure	**Content**
	Social Homogeneity	Environmental shaping	Contagion
	Performance Variation	Structural capital	Resource access

measuring them objectively, social media can objectively measure ties through their digital traces but has trouble articulating the nuanced meanings of ties in a social context.

Explanatory Goals: Users Versus Platforms

The other main axis for categorizing social network research is on the study's primary explanatory goals, specifically whether it is in explaining social homogeneity or performance variation (Borgatti and Foster 2003). Social homogeneity describes how network characteristics tend to exert a common influence on nodes within a particular network or a particular position within the network. These studies take the network structure as a given (e.g., the network's density) and examine its consequences in terms of behavior and outcomes for individual nodes (Kane and Alavi 2008; Kane and Borgatti 2011). Performance variation studies, in contrast, describe how and why particular nodes perform differently as a result of their network position. In these studies, the node's personal characteristics influence its motivation to take certain network positions or to shape the network to achieve desired outcomes (e.g., Kalish and Robins 2006; Obstfeld 2005; Sasovova, et al. 2011). These explanatory goals are not unique to SNA but reflect the classic tension in organizational literature between structure and agency, which also applies to networks as a specific form of organization (Astley and Vandeven 1983; Berger and Luckmann 1966; Burrell and Morgan 1979; Giddens 1979; Hrebiniak and Joyce 1985).

Considering our piece's focus, we interpret Borgatti and Foster's explanatory goals axis in a slightly different manner in order to adapt it to an IS setting. Rooted in a similar intellectual tradition (i.e., Giddens 1979), the IS literature shares the explanatory tension between social homogeneity and performance variation (e.g., DeSanctis and Poole 1994; Orlikowski and Robey 1991). On the one hand, the features of an information system enable and constrain its users in particular ways, resulting in similar behavior among users of the same system. For social media, these features may be technical (e.g., capabilities provided by the platform), normative (e.g., policies and rules of the platform), or economic (e.g., incentives for certain types of use behaviors). On the other hand, users may employ or respond to these features in very different ways, resulting in performance differences among users of the same platform. For example, people who use a system more than others often perform better (Devaraj and Kohli 2003), and users may employ systems in ways that were unintended or unanticipated by designers (Boudreau and Robey 2005). Thus, we focus on the features of the social media platform as the environmental mechanism that creates social homogeneity (i.e., why users of the same platform behave similarly) and user behavior as the primary mechanism responsible for individual performance variation (i.e., why users of the same platform perform differently).

Social Media Networks

This 2 × 2 framework of canonical social network research shares some noteworthy commonalities with the key novel features of social media technologies. In their seminal paper, boyd and Ellison (2007, p. 211) define social network sites as

> web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system.

While these core features of SNS have been remarkably robust to new developments, the evolution of social media since the original publication of their definition suggests several necessary amendments. In addition to these authors' updates to the original definition (Ellison and boyd 2013), we account for our own updates in adapting the original definition for our use here.

First, the "boundedness" of SNS has diminished, as these platforms have extended their functionality beyond the confines of a website. Many platforms provide an application programming interface that allows other technologies, such as other websites and mobile "apps," to build on the features and data available in the focal platform (Ellison and boyd 2013).

For example, Facebook's "Open Graph" protocol, introduced in 2010, enables all websites to integrate some functions of the Facebook platform (e.g., "like" button, user authentication) into their own sites. Third-party apps also facilitate increased interoperability among previously independent social media sites, allowing shared content to cross the boundaries of multiple distinct sites. For example, some applications allow users to post content simultaneously to Facebook and Twitter. Thus, the boundaries between social media platforms are less pronounced than they were previously.

Although Ellison and boyd (2013) continue to describe SNS as a distinct type of social media, we argue that the extension of these core features to other Internet sites and types of social media platforms require a terminology change. Thus, we will refer not to social network "sites" but more generally to "social media networks." Not only do we believe such a shift is more reflective of the current state of the technology, it confers a number of advantages consistent with the objectives of this paper. The dictionary definition of a medium conveys a number of related meanings: something in a middle position, a means of conveying something (i.e., a channel), and a condition in which something may flourish. All three meanings apply to our understanding of how current social media platforms mediate social networks. Much of the activity may occur outside the website, but the platform continues to be positioned in the middle of and mediate the relationships of the users it connects. It also conveys digital information among users, serving as a channel of communication. Finally, the features of the particular platform cause certain types of social interactions to flourish, more so than others.

Second, the nature of the user profile has changed considerably in recent years, requiring a deeper understanding of how users are represented in the network. boyd and Ellison describe the user profile as an explicit construction on behalf of the user that provides him or her with an opportunity to

> "type oneself into being"…by filling out forms containing a series of questions. The profile is generated using the answers to these questions, which typically include descriptors such as age, location, interests, and an "about me" section (pp. 211, 213).

Recent developments in social media platforms have augmented or replaced this user-constructed profile. Specifically, Ellison and boyd note that profiles now contain information from various sources, such as "user-supplied content, content provided by other users, and/or system provided data" (p. 154). These features expand the digital profile, beyond an exclusively intentional and conscious construction by the user, toward incorporating an automatic and passive record of the user's activity. Ellison and boyd further note that people can access content on the platform through means other than viewing the digital profile of others. People often obtain content from content streams automatically filtered from the network by the platform (Naaman et al. 2010). Users can also access content through search mechanisms, such as Google-like algorithmic search capabilities. For example, they might search for keywords in LinkedIn profiles to find people with particular skills or experience.

This ability to access and search content through various mechanisms also raises questions about the ability to protect content from others' access. Privacy has become a more significant issue as the use and adoption of social media has grown (Gross and Acquisti 2005; McCreary 2008). Although briefly addressed in their discussion of the private or semi-private nature of the user profile, neither boyd and Ellison's original definition nor their updates effectively capture the important role of privacy settings for social media. Most platforms provide robust features for users to control who can access the content they contribute. This control affects access to profile information and also can extend to all content contributed by the user to the platform. We argue that users' ability to access content through search and information streams further should account for the ways that users prevent shared content from being included in search mechanisms.

Therefore, our updated definition of social media networks possesses four essential features (Table 2), such that users (1) have a unique *user profile* that is constructed by the user, by members of their network, and by the platform; (2) *access digital content* through, and *protect* it from, various *search* mechanisms provided by the platform; (3) can *articulate* a list of other users with whom they share a *relational connection*; and (4) *view and traverse* their connections and those made by others on the platform.

These technical aspects exclude previous generations of collaboration technologies, such as e-mail or electronic discussion boards that do not allow users to establish profiles or lists of connections that can be viewed or traversed by others. It may, however, include technologies such as wikis, blogs, or microblogs, although Ellison and boyd do not regard these technologies as social network sites. For example, while Twitter is often referred to as a microblog service, it would be included in our definition because it possesses these features.

Third, social media platforms have been used for a much wider variety of purposes in recent years than originally envisioned. boyd and Ellison assert that users primarily use social media sites not to establish new social connections but to maintain existing social relationships. Although some re-

Table 2. Core Features of Social Media Platforms Addressed in this Paper (adapted from boyd and Ellison 2007; Ellison and boyd 2013)

Label	Feature
Digital Profile	The platform provides a unique user profile that is constructed by the user, by members of their network, and by the platform.
Search and Privacy	Users can access digital content through and protect it from various search mechanisms provided by the platform.
Relational Ties	The platform provides mechanisms for users to articulate a list of other users with whom they share a connection.
Network Transparency	Users can view and traverse their connections and those made by others on the platform.

searchers have critiqued their choice of terminology as overly broad (Beer 2008), these extensions may not have gone far enough to account for the various ways social media platforms are used. People use social media to support a broad range of social relationships, which may bear little connection to offline social relationships. Celebrities and sports figures use social media networks to communicate directly with fans with whom they have no offline relationship. Organizations also maintain profiles on social media platforms, and how people interact with organizations (and vice versa) will differ from purely interpersonal relationships. Furthermore, people also use social media in ways that do not primarily involve interpersonal interaction. For example, although wiki platforms may support social networking purposes (Kane and Fichman 2009), article development on Wikipedia involves collaborative production that may or may not involve interpersonal interaction. Likewise, the primarily purpose of many e-commerce networks (e.g., Tripadvisor, Amazon.com) typically involves reviewing products, not interacting with other users.

Given our focus on SNA in this paper, we limit our definition of social media networks to focus on how social media is used to support interpersonal interactions. We recognize that these "social" relationships can represent a wide variety of interpersonal interactions on these platforms, which may differ considerably from offline counterparts. We do not, however, address broader applications of social media, such as product review networks or peer production communities, when they diverge from this interpersonal focus.

The Intersection Between Social Media and Social Networks: A Frontier for Research

Networks that occur on and through social media sites will be shaped in part by the characteristics of those media, such that certain types of social interactions flourish while others do not. These social media platforms likely introduce differences in terms of how relationships form and develop and can introduce other differences back into the dynamics and outcomes of traditional, offline social networks. Thus, we argue for a theoretical synthesis between the frameworks used by traditional social network analysis and social media networks. We apply elements of the four-part definition of social media networks adapted from boyd and Ellison (2007) and Ellison and boyd (2013) to the canonical types of social network studies outlined by Borgatti and Foster (2003) to forge a framework for future social media network studies that can benefit from and contribute to theories of traditional social network analysis.

The features included in our definition relate to the explanatory mechanisms in Borgatti and Foster's framework: structure and content. The ability of users to *articulate their relational connections* and *view and navigate those connections* involves a capacity to visualize and manipulate the *network structure*—that is, how people establish and manage the connections between others in a network. Similarly, the ability to *establish a digital profile* and *access and protect content* contributed through the platform primarily involves *network content*, or how digital resources are shared and accessed through a network.

These features also can be categorized along the explanatory goals axis: social homogeneity induced by the platform and performance variation from user behavior. First, we place the features associated with the digital profile and the articulated list of ties in the column associated with the social homogeneity introduced by the platform, as these features introduce relatively novel research questions for both IS and SNA researchers. Traditional SNA proceeds from a natural science paradigm, observing and describing the fundamental components of social networks in ways that best reflect how these networks are observed in the offline world. Social media, however, introduces questions of *design science*, how to

implement the fundamental components of the network (i.e., nodes and ties) to achieve particular types of network behaviors (Ren et al. 2007). The ability to determine and manipulate the fundamental components of the network is more difficult in offline networks, so these questions about how to implement the user profile and relational ties on a social media platform and the associated outcomes for doing so represent an important and novel frontier for SNA research.

Second, we place the ability to navigate ties and to search and protect content in the column associated with the performance variation introduced by user behavior, as they represent relational capabilities that people do not possess in more traditional social networks. People typically are poor at identifying the structure of traditional social networks (Krackhardt and Kilduff 1999), yet social media platforms allow users to visualize and navigate the relational structure of a social media network. Content search generally occurs through relational ties in traditional social networks (Borgatti and Cross 2003). For example, if someone is looking for a job, they may ask their friends, relatives, and acquaintances if they know of any openings. A social media network such as LinkedIn, however, provides various mechanisms to access information in the network, such as keyword searches or information feeds, that would not require the user to directly ask their network connections for the needed information. Although social media platforms provide these novel capabilities to all users, people will likely use them to support their networking behavior in very different ways, if at all. These differences are likely to lead to significant performance variation between users, yet little is understood about how the use of these features leads to performance outcomes.

Our categorization of the explanatory goals axis should not be taken to mean that both the design and use of all social media features are not important; rather, they are meant to reflect the theoretically novel questions introduced by social media platforms. For example, questions about performance differences in terms of network behavior (i.e., number and type of ties people establish; Granovetter 1973) and the design of features such as privacy (Straub and Collins 1990) and information presentation (Gerlach and Kuo 1991) are certainly important for social media networks. But these questions have been addressed extensively in prior social network and IS literature, and we expect the findings to translate well into the study of social media networks. The question introduced by our categorization of the explanatory goals axis focus instead on how social media differs from traditional social network research. We highlight the new system design and user action capabilities that are unavailable in traditional social networks or information systems development and that potentially undermine the theoretical aspects of previous social network research, thus introducing a new and important frontier for research.

Applying the features described by boyd and Ellison and Ellison and boyd to the corresponding canonical studies in Borgatti and Foster's framework produces four key points of intersection between traditional social network research and social media technologies. These intersections provide a systematic and productive way to think about the implications of the features of social media technologies for traditional social network theory. In the remainder of this article, we deal with each point of intersection in greater detail. We address how these features challenge the assumptions of associated types of social network studies and the research questions that arise as a result. A summary appears in Table 3.

Designing Ties

The first intersection between social network research and social media platforms we explore in our 2 × 2 framework is how a social media platform induces homogeneity in a network structure among its users. *Environmental shaping* studies investigate the predictable effects of similar network positions or environments on the nodes that occupy those positions (Borgatti and Foster 2003). For instance, Erickson (1988) showed that people occupying similar network positions formed common attitudes. The feature of social media platforms associated with how user behavior will be homogenized as a result of network structure is the ability to *articulate a list of connections*. Although our definition of social media implies that all platforms allow people to articulate relational connections, these platforms often implement the connections quite differently from one another. For example, the relational ties embodied by Facebook "friends" differ somewhat from those of Twitter "followers," in that both parties in the relationship must confirm the tie on one platform but not on the other.

This ability to design and control the nature of the relational ties that constitute the network has profound implications for social network theories and methods. As we noted earlier, traditional SNA has proceeded from a natural science paradigm and focuses on observing, describing, and analyzing networks that already occur in everyday life (Ren et al. 2007). In social media networks, tie features are not exclusively a reflection of the underlying social relationships that occur in the network but instead determine in part the nature and characteristics of the relationships that will occur on the platform. These design decisions regarding how relational ties are implemented will enable and constrain users' interactions

Table 3. The Intersection of Social Network Research and Social Media Networks

		Explanatory Mechanisms	
		Structure	**Content**
Explanatory Goals	**Social Homogeneity Induced by Platform**	Borgatti and Foster: Environmental shaping. Nodes behave similarly due to the common network environment. boyd and Ellison: Platforms enable an articulated list of ties. Implications for SNA: Designers can easily determine the characteristics of ties established on a platform, providing greater control over the environment in which people network and encouraging particular types of network structures.	Borgatti and Foster: Contagion. Nodes behave similarly as a result of their interaction with similar content. boyd and Ellison: Platforms enable a digital network profile that is established by the user, members of the network, and the platform. Implications for SNA: Designers can determine what types of content should be embedded in the digital profile and how this profile reflects an offline identity, affecting the way information spreads across the network and influences users.
	Performance Variation from User Behavior	Borgatti and Foster: Structural capital. Nodes benefit from occupying particular structural positions. boyd and Ellison: Users can view and traverse network connections. Implication for SNA: Platforms provide accurate and equal information about the network structure, allowing users to employ this information in ways that may influence the development of structural capital.	Borgatti and Foster: Resource access. Nodes benefit from being able to access different network resources through relational ties. boyd and Ellison: Users can access digital content and protect it from various search mechanisms provided by the platform. Implication for SNA: Various content access and privacy mechanisms affect the role and importance of the relational structure for accessing resources in a network.

in similar ways, leading platforms with different tie designs to develop networks with different types of structures. As organizations increasingly seek to employ social media platforms for particular purposes—such as marketing or knowledge management (Kiron et al. 2012)—different network structures may be more desirable for some purposes than for others. Understanding how these structures are facilitated or hindered by tie design decisions will, therefore, likely become increasingly important as social media is employed in organizational settings.

Social network analysis offers a rich conceptualization of how to understand individual relationships and may provide a valuable resource for investigating questions of tie design. Ties may differ in type, number, symmetry, strength, and affect (Wasserman and Faust 1994), yet little research accounts for the potential implications of these various design characteristics on outcomes of social media networks. Furthermore, this rich history of describing social network ties in SNA may also provide directions for new tie features that may be designed in future platforms. Thus, a key opportunity for research in social media networks is to open the black box of how ties are constituted on social media platforms and to explore how these different design decisions in social media platforms enable and constrain user behavior in consistent ways, affecting the formation and outcomes of social media networks.

Tie Type

Although ties can be defined as simple connections between individual members, ties between nodes also can encapsulate various types of connections. Borgatti et al. (2009) note that SNA studies include four basic tie types that also might refer to the design of social media networks: proximities, relations, interactions, and flows. *Proximities* represent shared physical or social spaces, such as physical distances or co-membership in groups, which provide opportunities for ties to form. *Relations* are ties that reflect persistent social connections between nodes, such as role-based connections (friends, family) or affective relations (likes, dislikes). *Interactions* include discrete, transitory relational events, such as having lunch or signing an agreement with another node. Relations should increase the probability of interactions, and interactions can create or change relations. Finally, *flows* refer to tangible and

Table 4. Types of Dyadic Phenomena

Name	Proximities	Social Relations	Interactions	Flows
Description	Shared space/time	Relational states	Relational events	What moves between nodes
Examples	Living in same city	Friends; boss	Talking; sending e-mail	Goods; information
Social media	Being on the same platform or in same group; location-based services (e.g., Foursquare)	Facebook friends, LinkedIn connections, Twitter followers	Messaging, e-mail, discussion boards	Twitter trends and retweeted content, social bookmarking systems

intangible material (e.g., money, goods, information, beliefs) that can move from one node to another when nodes interact (Borgatti 2005). This rich understanding of social ties is important, because social media expands the types of social connections that IT can support (Table 4).

Previous generations of IT platforms (e.g., e-mail, discussion boards) most prominently supported interactions by enabling individuals to engage in discrete, transitory exchanges, without respect to proximity, social relations, or flows. Considerable IS research has investigated the social networks created through these virtual interactions (Ahuja and Carley 1999; Rice and Aydin 1991; Wasko and Faraj 2005). However, social media support a richer range of possible relational ties. For example, social media platforms help make *proximity* explicit to users through location-based services (e.g., Foursquare), such that users can establish relationships or exchange information based on shared physical place. It also can support *social relations* by allowing people to establish persistent connections with other users (e.g., LinkedIn connections) that facilitate the passive transfer of information between connected nodes. Finally, social media facilitate information *flows* among nodes that are not directly connected. A person can follow popular topics on Twitter regardless of his or her relationship with those involved in the discussion. Different tie types thus may represent fundamentally different network environments, influencing network formation in distinct and predictable ways.

It is not clear what effects these different tie types have on social media networks. Each type of tie might have a distinctive effect. Although previous IS research has investigated other facets of particular tie types, such as the influence of place and space (Dourish 2006; Harrison and Dourish 1996), we know little about how different tie types affect network formation relative to one another. The influence of various tie types on network formation in turn has important implications for the design of social media platforms. For example, marketers might be most interested in ties that facilitate information flow, in the hope that certain information "goes viral" (Aral and Walker 2011; Bampo et al. 2008; Hinz et al. 2011). In contrast, internal knowledge management platforms might explicitly discourage the uncontrolled spread of proprietary information (Brown and Duguid 2001; Liebeskind 1996) and instead cultivate ties that enable people to access the right information at the right time (Alavi and Leidner 2001; Grant 1996). Thus, different tie types may result in networks that are better suited for certain types of objectives or outcomes, but we know little about these differences.

Furthermore, the use of different tie types in combination with one another may differ when they are used independently. Many social media platforms support multiple types of ties. For example, Facebook supports all of the types of ties mentioned above: proximities (groups or location), relationships (friends), interactions (messages), and flows (trends or shares). Such questions about the use of ties in combination are particularly important because social media networks undermine the theorized relationship between the different tie types in traditional SNA. For traditional social network research, the four types of ties represent a continuum, such that each serves as the foundation for the next (Atkin 1977). In a sense, flows represent the outcomes of interactions, interactions are the outcomes of social relations, and social relations are facilitated by proximity. Yet interactions and flows also can affect the underlying ties, as when an exchange of confidences deepens a relationship. In social media networks, these different types of ties on a platform are typically decoupled from one another. Flows (Twitter trends) and relations (Twitter followers) can both occur without respect to interactions or proximities, for example.

Traditional social network research recognizes that networks are often *multiplex*, that is, comprised of multiple types of relationships, such as communication, trust, advice, influence, and friendship (Ibarra 1992; Podolny and Baron 1997). Multiplexity also describes IT-enabled networks, in terms of the channels across which a relationship can occur (i.e., online versus offline relationship; Wellman et al. 1996) and

the content provided by a particular channel (e.g., different USENET groups; Wellman and Gulia 1997). It is not clear whether the features of network multiplexity in traditional social networks apply in the same way to social media networks. For example, multiplexity is associated with tie strength in traditional social networks (Ibarra 1993; Wellman and Wortley 1990), but it may not be in IT-enabled networks. Research has shown that more frequent use of an IT-enabled communication channel expands its capabilities for conveying information, potentially resulting in rich interactions across relatively shallow channels (Carlson and Zmud 1999). Using multiple types of IT ties for communicating with someone may, therefore, mean that the user does not expand any of the channels to yield these rich communications, potentially rendering communication across multiple channels less rich than communication that uses a single channel in depth.

Furthermore, because one type of tie may serve as a foundation for another type (Borgatti et al. 2009), multiplex networks are often correlated in offline social networks (Ibarra 1992). For example, coworkers are somewhat likely to communicate frequently and become friends. It is not clear how these different tie types relate to each other in social media networks, where tie types are decoupled. These ties may be independent from one another, such that people use different types of ties to support fundamentally different networks of relationships. They may complement one another, such that two types of ties work together, leading to benefits greater than those derived from either type of tie alone. They may substitute for one another, such that the use of one type of tie implies that a person is not likely to employ the other type. They may also simply reflect a latent, underlying social network in which all social media ties are simply echoes of offline social relationships (Lampe et al. 2006), in which case introducing additional ties may create needless complexity and hinder effective collaboration (Alavi et al. 2002). Understanding the nature of this interaction effect has important implications for platform design.

RQ1: How do different types of ties (e.g., proximities, relations, interactions, flows), individually and in combination, affect users' networking behavior and shape the formation and characteristics of social media networks?

Relational Tie Features

Digital relations (e.g., Facebook friends, Twitter followers, LinkedIn connections)—defined as a persistent connection between nodes that enables various types of interaction—tend to provide the most significant technical difference between social media networks and previous generations of IT-enabled communication networks. These digital relations exhibit various characteristics that have clear analogues to traditional SNA descriptions of offline relations, such as number and symmetry (Wasserman and Faust 2004). How digital relations are designed may also enable or constrain users in particular ways (Table 5), which has implications for the characteristics of the networks that emerge on particular social media platforms.

The number of ties a person maintains is an important feature of traditional social networks, and it is often referred to as degree in the network literature. Some research suggests that humans are biologically limited in the number of relationships they can maintain (Dunbar 1993), yet they are not otherwise constrained to a fixed number of connections in real-world networks. Even if people have only a limited amount of time and energy to devote to social relationships, they have considerable latitude in determining whether to invest that energy in a few close relationships or many acquaintances. On social media platforms, designers can determine the number of ties that can be listed. Twitter allows unlimited followers, but Facebook restricts the number of friends to 5000; Path allows a maximum of 150, and the niche social networking application called Couple allows users to maintain only 1 other tie.

These design decisions have clear implications for the types of networks users maintain on a platform. The rationale for limiting ties is usually to encourage more intimate networks, yet it not clear whether it actually does so. Research has suggested that people are functionally limited in the number of ties they can maintain, regardless of the platform features (Ellison et al. 2011; Pollet et al. 2011). The user's personality characteristics also affect the level of intimacy developed through social media ties (Correa et al. 2012). Too many ties may create information overload, making it difficult for users to process the information provided by the network.

The maximum number of ties permitted on the platform should have implications for the types of analysis that can be performed on the platform, in that various traditional measures of network position (e.g., eigenvector centrality) would become computationally intensive at an exponential rate with an increasing number of ties. The difficulty in managing the computational requirements of larger networks was a key factor in the demise of the social media platform Friendster (Piskorski and Knoop 2007), as well as a notable problem for Twitter when it experienced rapid user adoption (Stone 2012). The number of ties permitted by a platform thus should have implications for the types of relationships people establish and the types of features the platform can provide to support them.

Table 5. Common SNA Tie Characteristics and Their Implications for Social Media Networks

Characteristic	Description	Implications
Degree	The total number of connections maintained by a node.	Platforms restrict the number of ties users can maintain, rationalizing that fewer ties equal greater intimacy. Some research suggests humans can only cognitively manage a limited number of ties (Dunbar 1993).
Symmetry	Whether both nodes in a dyad reciprocate a tie.	Symmetric networks are likely to exhibit different characteristics than asymmetric networks, such as exhibiting power-law features (Barabasi 2003).
Affect	Whether or not two nodes "like" or "dislike" each other.	Some social network research suggests that negative ties explain social network outcomes more than positive ties (Labianca and Brass 2006).
Strength	The frequency and depth with which two nodes interact.	Among the most commonly used measures in SNA, not widely implemented in social media networks. Weak ties are often associated with informational advantages (Granovetter 1973), and strong ties more associated with trust (Levin and Cross 2004).

Tie symmetry describes whether ties need to be reciprocated. In traditional social network research, tie symmetry was determined by the theoretical properties of the relationship. Certain relationships were conceptualized as symmetric, such as communication ties, because they were usually reciprocated equally. Other relationships seemed asymmetric, such as advice ties, because a subordinate could approach a boss for advice but the boss was less likely to solicit advice from the subordinate. In social media networks, these tie design characteristics actually determine, not reflect, how users of the network interact. For example, LinkedIn requires symmetrical relationships, confirmed by both parties, for a tie to exist. Twitter permits followers through asymmetrical relationships, allowing a tie to exist even if only one person initiates it. Finally, Facebook allows users to maintain both symmetric (i.e., friends) and asymmetric (i.e., fans) relationships on the same platform.

Tie symmetry may influence the behavior and dynamics of networks that develop on a platform. Companies and celebrities often amass millions of followers or fans on asymmetric networks like Twitter, which would be far more difficult and less likely if each relationship had to be reciprocated. Thus, tie asymmetry may lead to networks that exhibit a much wider distribution of ties, such that relatively few nodes amass many ties while a typical user maintains only a few. Considerable research investigates whether networks follow power law distributions (e.g., Barabasi 2003), and design elements offer an important element in predicting or cultivating such distributions. Tie symmetry also could influence the type of information people contribute to a network. For example, people may be more willing to share certain types of personal information in networks where they must verify each connection and other types of content in networks without such verification but potentially larger audiences. People may also form ties with different types of people knowing that the tie needs to be reciprocated or not.

These questions suggest that choices regarding the number and symmetry of ties made by the platform's designers are likely to enable and constrain users of a social media platform in similar ways, thus shaping the characteristics of the networks people establish using that platform.

RQ2: How do the features of relational ties (e.g., symmetry, allowable number) affect users' networking behavior and shape the formation and characteristics of social media networks?

Missing Tie Features

In addition to a more nuanced understanding of how to design relational ties in social media networks, SNA also provides insight into what tie characteristics might be missing from current social media platforms (Table 5).

One feature prevalent in SNA but missing from the design of most social media platforms is *tie strength*, or the frequency and depth with which two nodes interact (Mardsen and Campbell 1984). On the most popularly used platforms, users determine whether someone is a relational connection, but they have relatively few mechanisms to articulate or infer the strength of the relationship. Some studies seek to infer tie strength by observing other data available in the network (e.g., number of interactions, content viewed; Gilbert and Karahalios 2009), but it is not frequently implemented as a design feature of social media

networks. The value of relational tie strength could be established by user decisions (i.e., identify close relationships) or determined from interaction data (i.e., the number of times two connections actually send messages to one another) or some other mechanisms. Then IS researchers might explore how the concept of tie strength can be embedded in network platforms and its effects on network formation.

The implications of tie strength likely have complex implications for social media networks. For example, prioritizing information from close contacts may make networks more efficient at transferring information of known value (i.e., exploitation; March 1991) but less efficient in finding new information, the value of which is not recognized in advance (i.e., exploration). Similar trade-offs are widely recognized in previous studies of organizational knowledge sharing (Durcikova et al. 2011; Kane and Alavi 2007; Lazer and Friedman 2007).

Another possible missing tie feature is affect. Most social network research and social media platforms concentrate on ties with positive or neutral affect, but some research has suggested that negative or dislike ties have a far greater impacts in traditional social networks (Labianca and Brass 2006). Research consistently shows that negative tie relationships constitute somewhere between 3 and 8 percent of all organizational relationships. The ability to manage negative or undesirable relationships on a social network may be critically important to the network's functioning. In massively multiplayer online games, for example, the presence of negative ties dramatically affects gameplay, occurs with higher prevalence, and is more explicit than in offline social networks (Szell and Thurner 2012). Although some social media networks allow users to identify negative ties (Brzozowski et al. 2008), the most common approach to dealing with negative ties in social media networks is simply to allow users to ignore negative relationships. Twitter allows users to block certain individuals from following them; Facebook enables users to "hide" information from certain users. Yet the absence of a tie may be very different than a negative relationship and merits further examination (Kane and Labianca 2011).

Because negative relationships also may share mutual friends (e.g., *tertius gaudens*; Burt 1992), simply ignoring these relationships may prove difficult; as the famous adage advises, keeping friends close but enemies closer might be a user's desired approach. Others instead might strengthen their relationships by announcing their negative ties to others (e.g., opposing a local politician or a particular company executive prompts certain users to form relationships, either openly or surreptitiously). Other procedures for reflecting negative relationships in social media networks may provide more value for the network than ignoring them, but the possible negative affect of social relationships has received little attention from researchers or practitioners, despite their importance in traditional offline networks.

RQ3: What tie features are missing from social media platforms (e.g., strength, affect)? How might these features affect users' networking behavior and shape the formation and characteristics of social media networks?

Digital Profiles: Node or Content?

The second intersection between social network research and social media platforms we explore in our 2 × 2 framework is how the content supported by social media platforms induces homogeneity among its users. Borgatti and Foster (2003) describe social network studies of this type as *contagion* studies that investigate how interactions with similar network content exert predictable effects on the individuals who interact with that content. The terminology of contagion draws from epidemiology, in which the interaction with a biological pathogen spreads through a network by various social contacts (e.g., sneezing, sexual relations) and then affects the individual who contracts that pathogen (i.e., he or she falls ill). Likewise, different types of network content (e.g., gossip) can spread through social networks (Ellwardt et al. 2012; Grosser et al. 2010) and affect anyone who comes in contact with it (e.g., change attitudes about another; Burt and Knez 1995, 1996). Studies of how content spreads and influences users in a social media network have been of considerable interest (Aral and Walker 2011; Bampo et al. 2008; Hinz et al. 2011), especially considering the early adoption of social media tools for marketing purposes (Fader and Winer 2012).

The feature of social media platforms associated with how user behavior will be homogenized through digital content is the *digital profile*, which can be conceptualized in two different ways with respect to contagion studies. First, the digital profile is a node in that it represents the user in the network, which reflects the user's identity in the network in ways consciously and unconsciously determined by the user. In this case, similar arguments regarding design science that we forwarded in the previous section can and should be extended to the capabilities of digital profiles. Certain features of the digital profile implemented by platform designers, such as the profile automatically providing

information about the user's activity or allowing third parties to contribute content to others' user profiles, will affect the degree to which these nodes are "susceptible" to content contributed to and contained in the network. These design decisions likely homogenize user behavior in predictable ways. For example, users will likely behave differently on a platform that preserves one's activity in the network on the digital profile than on a platform where this information is not included. People share different content on Snapchat, a platform that explicitly does not associate content with a user's profile by automatically deleting that content after a short period of time, than similar platforms that do associate content with profiles (e.g., Instagram).

Second, the digital profile can also be viewed as content in that it consists of the same digital information that flows through the network. In this conceptualization, the user is the node in the network and the profile that represents the content through which the user influences and is influenced by others. By representing potentially different types of users through common types of digital profiles, platform content homogenizes users in a very literal sense. A profile might represent an individual, an organization, a group (e.g., customer service), or a role (e.g., community moderator, subject matter expert), yet all could be represented in the network through a similar digital profile with identical features. How this homogenization of different types of users into similar digital identities affects how users influence and are influenced by others in social media networks is an open research question with few analogues in traditional social network research.

Profile Design: The Profile–Network Relationship

One main question facing contagion studies in social media networks pertains to how the features of the user profile influence the way content spreads across and affects others in a network. Ellison and boyd (2013) refer to three sources of content in the user profile—content type, digital activity trace, and third-party contributions (Table 6)—and we suggest these sources may each affect how content spreads in a social media network.

First, the *type of content* contained in the profile may influence how content flows across the platform. Digital profiles generally allow users to contribute different types of content, such as text, multimedia (e.g., pictures, audio, video), and hypermedia (e.g., links, tags) (Lampe et al. 2006; Zhao and Jiang 2011). With text, users provide descriptive information about themselves that is easily searchable by other users; we investigate the implications of this access in greater depth in a subsequent section. Rich multimedia content may cultivate greater social presence, which tends to be conducive to the effective transfer of information on digital platforms (Fulk 1993; Miranda and Saunders 2003; Rice 1992). The availability of hypermedia creates opportunities to connect the profile to other content, both inside and outside the social media platform, which thus broadens the types of information presented on the platform. It also allows the content of the network to provide a reference to other content, lowering the computational requirements for sharing it with others but without sacrificing the possible richness and depth of that content for consumers. Understanding how the type and amount of content provided by a digital profile influences the perceptions of others in the network is still poorly understood, particularly in current technological settings of vastly increased bandwidth and storage that make more types of content available.

Second, digital profiles are increasingly augmented or even superseded by digital trace features, or users' activity contained in the digital profile. The digital trace may be a record of content that the user has contributed (e.g., status updates), commented on (e.g., reacting to the status updates of others), viewed (e.g., automatically reporting what content was read), or interacted with (i.e., "liked" on Facebook). Digital traces encourage certain types of behaviors in the network that might facilitate the flow of certain types of information. For example, if the digital trace indicates that a trusted other or a substantial proportion of the person's contacts have viewed particular content, it may encourage the focal user to view it as well, increasing the tendency toward herding behavior (Oh and Jeon 2007) or the viral spread of information (Aral and Walker 2011; Bampo et al. 2008; Hinz et al. 2011). It also may encourage users to act in ways specifically intended to influence their digital trace, such as when Digg users conspired to keep one another atop a digital leaderboard (Dellarocas 2010).

Conversely, this digital trace may discourage other types of behaviors. For example, research has suggested that some people use social media networks as a "cover" for socially undesirable behaviors, such as participating in a professional social media network like LinkedIn to cover up a job search (Piskorski 2009). If the digital trace provides information about these behaviors, it may change the types of behaviors people undertake on the platform. For example, if LinkedIn provided information about the number and type of job postings a user viewed, people may be less likely to use the platform for this purpose, lest their boss or coworkers learn of these behaviors and discover s/he is actively looking for other employment.

Table 6. Digital Profile Features and Their Implications for Social Media Networks

Feature	Description	Implications
Profile Content	The forms of digital information that a digital profile will support (e.g. text, multimedia, hypermedia).	Content richness is associated with the level of digital presence supported by an IT platform (Miranda and Saunders 2003).
Digital Trace	The types of data platforms collect and present about user behavior.	The types of data collected and associated with the profile will encourage certain types of behaviors and discourage others (Piskorski 2009).
Third-Party Contributions	Whether other members of the platform can contribute information to, edit, or create profiles for the user.	Users must consider the potential behavior of other users when making use (Burton-Jones and Gallivan 2007) and adoption (Venkatesh et al. 2003) decisions of social media platforms.
Authenticity	The degree to which the digital profile accurately reflects the user's offline identity.	Similar to anonymity, which influences how people interact using information systems (Sia et al., 2002), profiles introduce the possibility of pseudonymity, identities consistent in network but unrelated to offline identity.
Inverted Modality	Different types of users (e.g. individual, group, company) being represented by similar digital profiles.	Profiles will exhibit different capabilities, interests, and goals depending on the type of user it is intended to represent. Reverses traditional concepts of multimodality in social networks (Kane and Alavi 2008).

Third, other users in a network can add to or modify content in user profiles. Users might post new content to others' profiles, link other content to profiles through tags, or comment on existing content in the profile. People can post independent recommendations of others' work on LinkedIn, which may lead additional users to trust the profile information more. Alternatively, users may tag unflattering pictures of someone taken at an office holiday party, which then become part of the user's profile and visible to others in the network, lowering that person's reputation. In an extreme form, users might establish a fake profile, with or without the person's knowledge (e.g., boyd 2004).

This ability for third parties to contribute to a user's digital profile is similar to established concepts in the traditional IS literature, such as indirect use (Kane and Alavi 2008; Kraemer et al. 1993) or use-by-proxy (Burton-Jones and Gallivan 2007). These prior studies, however, have generally assumed that any indirect use is on behalf of and with the consent of the user, an assumption that may not hold in social media networks. The ability for third parties to adopt the platform on behalf of another user, for better or worse, adds new considerations to traditional individual IT adoption decisions (Venkatesh et al. 2003). People may adopt a particular platform not because they find it useful or easy to use but because they do not want the system to be used against them. Similar rationales underlie strategic recommendations for why companies should engage in social media, if only to monitor the contributions of others in the network (Kane et al. 2009).

Far from the conscious presentation typical of early social media platforms in which users were "typing themselves into being" (Sunden 2003), a digital profile now organizes various types of information about the user in a single place, accessible by others. Thus, the features of the digital profile have important implications for how content spreads across and affects users in a network.

RQ4: How do the features of the user profile (e.g., content type, digital trace, third-party contributions) affect users' behavior and influence the way content spreads across a social media network?

Digital Identity: The Profile–User Correspondence

The relationship between the user and his or her profile may also affect how content influences the user and how the user influences the network. Although the features of digital profiles may be consistent across a platform, they often represent many different types of users. A profile might represent an individual, an organization, a group (e.g., customer service), or a role (e.g., community moderator, subject matter expert). We suggest two aspects of this profile–user correspondence will be relevant to how content spreads and influences others in social media networks: the authenticity of the profile to an offline identity and the nature of the offline identity the profile is intended to represent (Table 6).

First, the degree to which a profile represents an actual offline identity, according to others' perceptions, may influence how content spreads in a social media network. We refer to this feature as *profile authenticity*. Many different aspects of the platform can cultivate authenticity. The platform's technical features might restrict access to certain profiles to users with a particular type of e-mail address, such as requiring an ".edu" address to join an academic network. Authenticity also might result from organizational decisions by managers of the platform. For example, Twitter verifies the identity of certain users and Sermo.com allowed only licensed physicians to join. Community rules or standards also can enhance authenticity. Wikipedia explicitly restricts using profile pages as social networks,[2] even though the technical features do not prevent such uses (which is why we exclude Wikipedia from further treatment; that is, for normative, not technological, reasons). It also can result from user incentives. There may be little intrinsic incentive to maintain a false profile on networks such as LinkedIn that facilitate professional relationships, whereas those incentives likely differ in other networks like Twitter (e.g., for entertainment, by tweeting as Homer Simpson or Lord Voldemort; for politics, by pretending to be an opposition candidate; for social commentary, by tweeting in the name of a controversial firm such as BP or Goldman Sachs).

In many ways, authenticity is the opposite of anonymity. Considerable research investigates the impact of anonymity on online collaboration (Connolly et al. 1990; Dennis 1996; Hayne et al. 2003; Valacich et al. 1992), and similar dynamics may result from the degree to which profiles are disconnected from real-world identities. Nevertheless, the digital profile may change the nature of anonymity somewhat by introducing the possibility of *pseudonymity*—a profile with a consistent identity within the network, despite no clear connection to any offline identity. The user's identity in the network may be supported by reputation mechanisms that explicitly record his or her activity in the network, such as when online communities explicitly identify the most prolific or helpful contributors (Bakos and Dellarocas 2011; Bolton et al. 2004; Dellarocas 2003, 2005).

Pseudonymity may exert a different influence on how information gets contributed and shared in a social media network. Similar to anonymity, people may be more willing to trust information on a site that connects profiles to real-world identities (Dennis 1996). For instance, people may be more willing to trust project management advice from someone whose LinkedIn profile lists years of experience and is verified by third-party recommendations. Unlike anonymity, however, people may be less willing to behave in ways that lead to group polarization when their online reputation is at stake (Sia et al. 2002), even if that online reputation has little connection to the user's real-world identity. We need further insights into how the authenticity and pseudonymity provided by digital profiles affect collaboration, compared with the effects of anonymity.

Second, a digital profile may reflect many different types of users in a network, such as an individual user, a group, or an entire organization—a feature we refer to as *inverted modality*. Although traditional SNA can examine many different types of nodes (e.g., people, groups, companies), it generally studies networks with a single type of node. Networks that examine different types of nodes typically employ specialized metrics, because each type of node has fundamentally different characteristics, such as two-mode or multi-mode networks (Borgatti and Everett 1997; Faust 1997; Monge and Contractor 2003). In social media networks, nodes are represented by a digital profile, regardless of what that digital profile represents in the offline world. A single digital profile may represent an individual user, a group of users (e.g., customer service group) or an entire organization (e.g., company profile). Even if the profile represents a single individual, its correspondence with that person's offline identify is complex. A single user may maintain different profiles to reflect his or her purposes or roles, such as personal, professional, and hobbyist. Even when a profile is an authentic representation of an offline individual, people may exhibit different conceptions of how that profile represents them (Schultze and Orlikowski 2011). A profile may also represent a former person; many platforms struggle with how to handle the persistent digital profiles of users who have died (Brubaker and Hayes 2011).

Digital profiles invert the nature of network modality, because users are represented by a profile with common features in the network, even though they may represent many different types of offline entities. These differences likely have important implications for established SNA contagion theories, which tend to be based on the capabilities or tendencies of a single type of node. For example, the theory of weak ties argues that weak ties are more valuable than strong ties because people can maintain more of them (Granovetter 1973). Nevertheless, a social media profile representing and managed by a group will be able to support more ties than one representing an individual, regardless of the strength of the ties maintained. The homophily principle suggests that people with shared characteristics are more likely to relate to one another (McPherson et al. 2001), but it is unlikely to

[2]http://en.wikipedia.org/wiki/Wikipedia:User_pages#What_may_I_not_have_in_my_user_pages.3F.

apply to profiles maintained by companies that are seeking to interact with customers. It is not clear how inverted modality—defined as a multimodal network with heterogeneous, dissimilar nodes that are represented by unimodal profiles—influences the spread of content across and its influence on nodes in a social media network.

RQ5: How does the correspondence between the digital profile and the user (e.g., authenticity, modality) affect users' behavior and influence how content spreads across the network?

Visualizing Network Connections

The third intersection between social network research and social media platform we explore in our 2 × 2 framework is how the structure of social media networks leads to performance variation among users of the same platform. Perhaps the most prolific category of traditional social network studies, researchers have long examined how the structure of a social network leads to predictable performance outcomes for people in that network, which Borgatti and Foster (2003) refer to as *structural capital* studies. For example, bridging a structural hole position—that is, connecting two otherwise unconnected individuals or groups—is a classic position of advantage in the structural capital literature. This network position provides those who occupy it with benefits, such as improved timing of, access to, and referral of information, as well as control benefits over flows between disconnected nodes (Burt 1992). Much of the previous IS research involving SNA falls into this structural capital category, with researchers investigating how patterns of ties in IT-enabled networks affect user performance, such as discussion boards (Ahuja and Carley 1999; Ahuja et al. 2003), e-mail networks (Aral and Van Alstyne 2011; Gandal et al. 2009), and collaboration platforms (Ransbotham et al. 2012).

The feature of social media platforms related to how users will perform differently as a result of network structure is the capability to *view and traverse network connections*. This feature provides users with valuable information about the structure of their social networks that can inform their networking decisions. Although Ellison and boyd (2013) argue that the typical SNS user does not currently use this information about network structure to inform their networking decisions, we expect this tendency will change as social media is increasingly used for professional purposes. Organizational application of social media will likely cultivate greater interest in and need for strategic networking at multiple levels, leading to greater use of information about network structure (DiMicco et al. 2008; Weng et al. 2010).

The platform can provide information about a user's personal network structure (i.e., direct connections), such as the number of ties or the number of mutual friendships shared with others. It can also identify global network structures (i.e., descriptions of network positions taking into account paths beyond direct connections), such as eigenvector centrality that can reveal the influence of a node in the broader network. People can use this information to cultivate networks with particular structural features that would be conducive to certain types of outcomes. Table 7 provides a summary of several such network structures and the associated outcomes identified in the traditional social network literature. Platforms also can provide this information in different formats, such as network visualizations (Trier 2008; Zhu and Watts 2010) or key metrics (e.g. mutual friends, network centrality) that can be used to understand where the structural capital exists in a network.

This availability of information about network structure raises important theoretical questions for social media networks, because it provides users with capabilities they do not possess in traditional social networks. People are often highly inaccurate in their perceptions of group network relations (Krackhardt and Kilduff 1999). Although structural capital research shows that certain positions are advantageous for the people who occupy them, it is often difficult for people to accurately assess the structure of the network to know where those advantageous positions exist or their own position in the social network. Part of the performance variation arising from the structural capital of the network is, therefore, derived from a person's ability to accurately identify the network structure in order to occupy advantageous positions. Social media platforms provide users with the capability to accurately visualize and analyze network structure, which may influence networking behaviors.

Furthermore, people often vary considerably in their ability to visualize the network structure accurately, which is itself associated with performance variation (Krackhardt 1990). Not only do social media platforms provide the ability to accurately analyze network structure on multiple levels and in multiple ways, they provide these capabilities equally to all users, fundamentally altering how structural capital is generated in social networks. Yet, it is not the mere provision of information about the network structure by the platform that will affect social capital, but how people use this information to make networking decisions. Users are likely to employ this information in considerably different ways—or not at all. These different uses of structural information provided by the platform will influence the users' development of structural capital and likely result in significant performance variation between users of the same platform.

Table 7. Structural Features of a Network and Associated Outcomes

Structural Feature	Definition	Associated Outcome
Personal (Egocentric) Network Positions		
Degree Centrality	The number of direct connections to other nodes held by a node.	Greater access to network flows (Freeman 1979).
Closeness Centrality	The average number of steps to access all other nodes in a network.	Fast access to network flows (Freeman 1979).
Betweenness Centrality	The number of shortest paths connecting other nodes in the network that pass through that node.	Fast access and control over network flows (Freeman 1979).
Eigenvector Centrality	A measure of a node's status is determined both by its number of direct connections, as well as how well connected its contacts are in turn.	Status in the network as reflected by whom one is tied to (Bonacich 1987).
Structural Holes (Constraint)	A measure of the extent to which a node bridges two otherwise unconnected nodes (i.e., being the bridging actor in an open triad).	Fast access to unique non-redundant information, control over the release of that information, and referrals from disparate network nodes (Burt 2000).
Features Describing Overall Network		
Density	The number of existing ties divided by the number of possible ties in a network.	High density is a breeding ground for trust and generalized exchange, at the cost of redundant information (Coleman 1988).
Transitivity	The extent to which triads in the network are closed (i.e., all three nodes are connected to each other).	High transitivity suggests a tendency for individuals to have their ties become acquainted over time and to become homogenized (Davis and Leinhardt 1972; Krackhardt 1999).

Network Information and Structural Capital

Although users have access to information about the network structure that may be difficult to obtain in traditional social networks, it is unclear how they will use this information to develop structural capital. People will likely use this information about network structure to inform their networking behaviors in very different ways. In offline networks, people who are high self-monitors network differently than low self-monitors, such that they are more likely to end up in network positions with high structural social capital (Mehra et al. 2001). Similar types of differences between users may also occur in social media networks. Rational actors might use information about network structure provided by social media strategically, to connect or interconnect in ways that explicitly improve their structural capital. For example, they may make and break ties to maximize their diversity and minimize the number of mutual friends in order to more efficiently access valuable content in the network. They may also use information about the network structure to identify structural holes in the network that can be exploited for advantage (Burt 1992). Others may not use this structural information strategically, but in ways that reinforce their natural networking tendencies. Balance theory suggests that people are more likely to establish ties with friends of other friends (Heider 1946, 1958). Social media networks that provide information about mutual friends thus could encourage people to establish connections with unconnected mutual friends, limiting the strategic value of these additional connections. In this case, the already ephemeral nature of structural holes (Burt 2002) thus becomes more so, and individual nodes are less likely to be able to maintain the benefits of bridging for any appreciable time. Similar counterproductive dynamics appear in other types of online networks, too. For example, VanAlstyne and Brynjolfsson (2005) find that although the reduced geographic and temporal constraints of online communities theoretically allow people to connect with a greater variety of others, these relational capabilities and flexibilities actually lead them to connect with people like themselves, not diverse others.

Furthermore, the easy availability of structural information might encourage people to network in ways simply to influ-

ence key metrics. For example, people may seek to establish more connections simply so that the platform will show they have many friends, perhaps intending it as a signal of status instead of a reflection of their actual networking behavior. Alternatively, users may intentionally cultivate a relatively small number of connections to signal intimacy. The group decision support system literature indicates that providing feedback about a user's decision making influences that process, and information about network structure may prompt similar responses (Sengupta and Abdelhamid 1993; Sengupta and Te'eni 1993). It is not clear whether these network structures will have the same performance implications in social media networks when the metrics are cultivated as an end in themselves, rather than serving as a description of networking behaviors. In short, although social media networks provide information about network structure that is otherwise difficult to obtain accurately in traditional social networks, it is not clear whether and how people will use this information to develop structural capital.

RQ6: How do people use information about the network structure provided by social media platforms to develop structural capital, and how does this use result in performance variation between users?

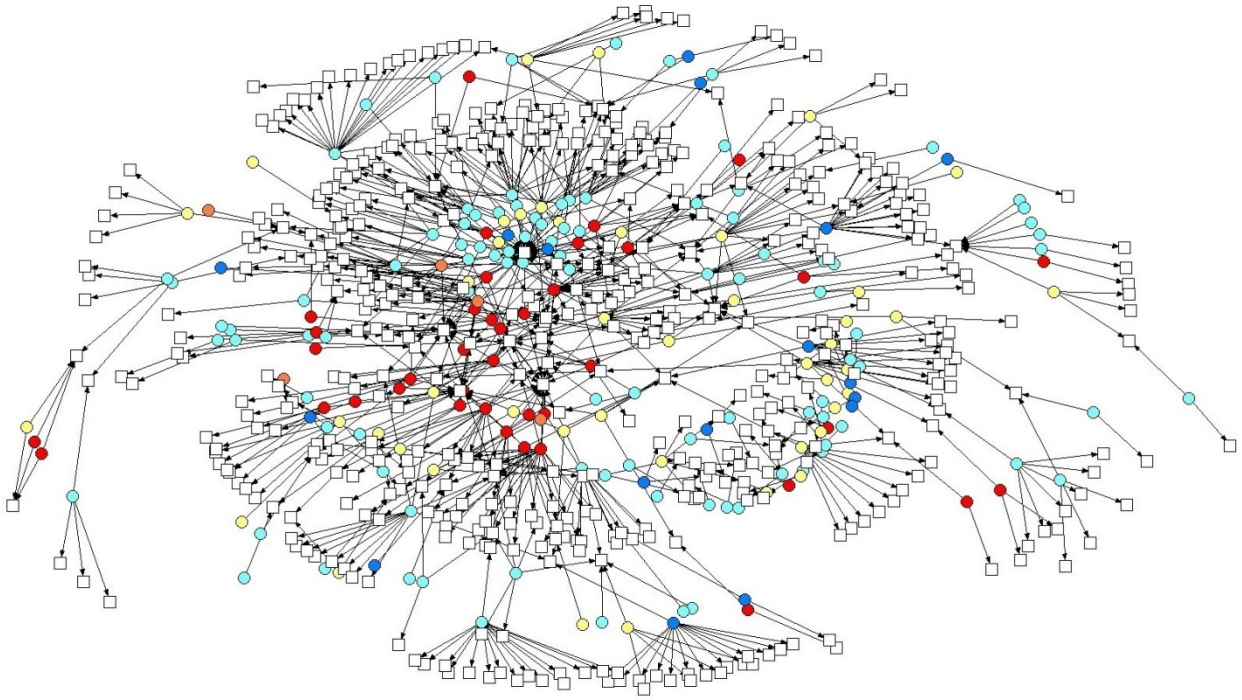
Third-Party Access to Network Information

In traditional social networks, not only are people poor at identifying the features of their own network, but they are even worse at identifying the structure of others' networks (Marineau et al. 2012). People vary considerably in their ability to visualize the network accurately, which also has implications for their individual performance (Krackhardt 1990). Not only do social media platforms provide this information about network structure to users, but it also provides this information to all users equally. This democratized access to network structure information introduces another set of questions for SNA, since people may factor others' awareness of network structure into their networking decisions. For example, a user may seek to connect with influential people to increase their reputation among their network or avoid connecting with people with poor reputations to prevent others from associating them with the low-status individual. Users may also decide to break connections primarily because others will observe it, such as a public sign of disapproval.

This democratized information about network structure could generate complex network dynamics. Actors could use information about the network structure to identify structural holes and bridge them, such that they obtain the advantages associated with these structural positions (Burt 1992). Yet others in the network will be made aware of this new bridging tie and may be alerted that the other actor has occupied the structurally advantageous position. These others could decide to bridge the same structural hole, to derive some of the benefits for themselves; or they might seek to occupy the positions simply to reduce the benefits enjoyed by their competitors in highly competitive environments. Conversely, such network transparency may reinforce certain network norms, such that all members of the network recognize others' activity. If third parties can visualize the network structure, it may be more apparent when users attempt to network strategically (e.g., breaking redundant relationships), which may create censure by others seeking to enforce norms of connectedness and mutuality (e.g., Coleman 1988). Thus, previous questions about the relationship between transparent network information and structural capital get compounded when all members of a network can access and use information about the network structure equally to inform their networking decisions.

Other third parties, such as managers, might also be able to leverage available information about the network structure to improve the structural capital available throughout the network as a whole, even if it is detrimental to any one node's structural capital (Cross and Parker 2004). If social media platforms provide dashboards or network visualizations, organizations using social media for internal collaboration could more easily view the network structures of their employees (Smith and Fiore 2001). For instance, Figure 1 shows how multiple collaborators work together to develop information artifacts, with the information quality of the artifacts color-coded. Similar types of visualizations should show interactions between people, color coding aspects of the employee, such as performance, expertise, tenure, rank, etc. With this information, managers can identify possible information bottlenecks, find employees with considerable informal influence, and determine if particular groups who should be talking to one another are not. Managers further could plan interventions to improve network structures and then use the dashboard to determine if the interventions were successful. Whereas previous generations of managers had to "walk around" to obtain imperfect information about the network (Peters and Waterman 1982), managers whose employees communicate through social media may gain access to a much more robust version of the same information through their computers.

It is uncertain how employees will react if managers employ information about network structure in this way. They could protest the intrusion, citing their rights to privacy (McCreary 2008). If employees realize their managers are using this information, they might network differently and conduct certain, sensitive communications through nonelectronic chan-



Social media platforms can provide visualizations of employee interactions that could allow managers to assess how well employees and groups are working together (adapted from Ransbotham et al. 2012).

Figure 1. Example of Social Network Visualization Enabled by Social Media

nels (Mason 1986) or communicate in ways designed only to improve their network statistics. Alternatively, as people become increasingly exposed to social media outside the workplace, they may feel increasingly comfortable with managerial uses, because all social media sites track behaviors, such that they might even welcome the new capabilities that make the organization more transparent.

RQ7: How do third parties use information about the network structure provided by social media platforms to develop structural capital, and how does this use result in performance variation between users?

Analytics and Computer-Aided Networking

The lack of clarity users face about how to use information about networks to improve their structural capital has prompted some platforms to begin designing computational mechanisms to aid users in these efforts. Through these *computer-aided networking* features, platforms use information about the network structure to make recommendations for networking behaviors. Facebook thus recommends "people you may know" to help users establish connections with others. LinkedIn provides information about which relational connection can serve as a boundary spanner to connect the user to a desired contact. Some services, such as Klout, provide influence scores for social media users, which could be expanded to recommendations for increasing any one user's influence score. Social network measures might improve these recommendation algorithms, particularly with respect to global network measures that seem less observable or comprehensible to individual users (Weng et al. 2010). For example, because network betweenness centrality is associated with career benefits (e.g., Brass 1981; Mehra et al. 2006; Sparrowe et al. 2001), platforms might recommend that users establish relationships that improve their betweenness centrality in the network.

Yet, these recommendations will only facilitate the development of structural capital if people actually use this information to inform their networking behaviors. The platform may use strategic considerations to make recommendations, but the user may adopt entirely different criteria to decide whether to follow those recommendations. Some people may be reluctant to make the connections recommended by the

platform unless they already know the recommended individual; the recommended person also may be reluctant to invest energy in or share information with people who have only been recommended by a decision engine. Considerable IS research investigates how users employ recommendation engines for their product purchase decisions (Komiak and Benbasat 2006; Wang and Benbasat 2005; Xiao and Benbasat 2007), which may be helpful in developing network recommendation engines. For example, perhaps users respond more favorably to a recommendation if the platform provides a rationale for it (Wang and Benbasat 2007). Similarly, the platform may be able to provide relevant information (e.g., explaining that establishing a certain connection would bridge a structural hole) or highlight key details (e.g., shared an alma mater or passion for sports) to facilitate introductions.

RQ8: How and why do people use (or not use) computer-aided networking recommendations to develop structural capital, and how does this use result in performance variation between users?

Privacy and Access Mechanisms

The fourth intersection between social network research and social media platforms we explore in our 2 × 2 framework is how the content available in social media networks affects performance variation between users. Borgatti and Foster (2003) refer to social network research in this category as *resource access* studies. In this vein of social network research, the performance of individuals in a network improves as a result of their access to valuable resource content flows through their network connections. People who can access more valuable resources are more likely to experience performance improvements. The key resource in social networks is digital information, and considerable research addresses the role of social networks and IT in moving the right information to the right place at the right time so that it can be used effectively (Alavi and Leidner 2001).

The capability of social media platforms associated with how users perform differently as a result of their ability to access network resources is the ability to search and protect digital content. Social media networks provide various content access mechanisms, such as information feeds or algorithmic search capabilities, that allow users to access others' digital content without interacting directly with them (Ellison and boyd 2013). People can access content found in other users' digital profiles (i.e., nodes) or preserved in their interactions on the platform (i.e., ties). The implications of these content access mechanisms for a paradigm in which the relationship is the central construct are profound. In traditional social networks, people consciously decide what information to share with others, but in social media networks the source may not even be aware that the content was used. If users do not employ relational ties to access the resources available in the network, what role do relational ties play for content access in social media networks?

The simplest effect of these mechanisms may be that people no longer need to establish relational connections on a platform, because search mechanisms grant them access to needed information without requiring relational connections with the knowledge source. However, many people likely contribute content initially for the benefit of their direct relational ties, so relational connections likely determine in part what resources are available in the network. Furthermore, many content access mechanisms rely on the relational connections to determine what information to provide through certain information streams, so the relationship between search mechanisms and relational connections for resource access is likely complex. How people use these new search mechanisms for finding and accessing resources in social media networks will have a profound implication on a user's ability to access network resources and affect their performance.

We also argue that the implications of these search mechanisms should be understood alongside the related capabilities provided by most social media platforms to protect one's content from these search mechanisms and access by others in the network (Gross and Acquisti 2005). Online privacy has long been of interest to IS researchers (Belanger and Crossler 2011; Smith et al. 2011). This capability to protect content will also have theoretical implications for resource access in social media networks, because search capabilities and privacy protections in social media networks change the calculus of resource access. Resource access in traditional social networks is typically a function of the knowledge seeker and his or her ability to know, value, and access the resources contained in a network (Borgatti and Cross 2003). Privacy settings instead make resource accessibility a function of the knowledge provider, who can control the ability of others to know and access what content they have provided. These privacy features also counteract a trend predicted by traditional social network researchers (Krackhardt 1994) that with the "widespread diffusion of advanced communication technologies, we can expect technical barriers to [resource] access to become less important" (Borgatti and Cross 2003, p. 435). The increased emphasis on privacy features in social media networks raises the importance of technical features for resource access in these networks, but the influence of the use of these technical features on resource access and performance variation involves complex dynamics that merit further research.

Content Access Mechanisms

In traditional social networks, most content accessible through ties is generated in response to specific questions (Borgatti and Cross 2003; Constant et al. 1996). In social media, however, it is possible to pre-construct the content and release it at will to those who seek it through various content access mechanisms. For example, users might search content contained in the digital profile of other users, augmented by algorithmic search capabilities. Recruiters often search profile content on LinkedIn to find people suitable for a job opening; members of large, knowledge-based companies may search the profiles of other employees to find people within the firm who possess needed knowledge (Alavi et al. 2005). Network interactions also provide searchable content; Twitter hashtags allow people to organize content by topic and "cashtags" allow users to organize content around particular stock ticker symbols. Platforms also provide automated information streams (e.g., Facebook NewsFeed, Twitter Trends) that automatically identify potentially valuable or popular information in the network (Ellison and boyd 2013).

Previous literature would suggest that content access mechanisms likely perform different functions than relational ties for accessing content. For example, weak ties are better suited for searching information in a network, whereas strong ties are better suited for transferring information (Hansen 1999). Similarly, content access mechanisms may be better for finding needed content, but relational ties may serve to help the user understand whether to trust its validity. Strong ties also facilitate the transfer of tacit knowledge, whereas weak ties are superior for transferring explicit knowledge (Hansen 2002). Content access mechanisms may be better suited when the user can articulate the knowledge he or she needs, whereas relational ties may prove better for providing serendipitous knowledge that the user may not know would be valuable. The preceding logic would suggest that weak ties are most easily replaceable by content access mechanisms, but weak ties represent the most typical way to understand electronic relationships in organizational literature (Constant et al. 1996; Pickering and King 1995). This logic might suggest that strong ties in social media networks may be best suited for resource access, and some preliminary research supports this assertion (Koroleva et al. 2011). Thus, the use of content access mechanisms may change the very purpose of relational ties in social media networks.

Furthermore, a complex interaction between relational ties and content access mechanisms may exist, in which content access mechanisms may influence the networks users develop. For example, content access mechanisms may influence with whom a user connects. Search capabilities may allow users to identify people who provide valuable resources better in a social media network and facilitate tie creation with these valuable others. Keyword searches might lead the user to find a source in the network that provides valuable and desirable content, allowing the user to establish a connection with that person to access future information more easily. Other content access mechanisms may lead users to break relational connections (Kivran-Swaine et al. 2011). If a user employs an information stream that summarizes the content contributed by the members of a network (e.g. Facebook News Feed), the user may break connections with users that provide undesirable, inappropriate, overly abundant, or otherwise not valuable information, even if the relationship with the other person continues in other contexts.

Such a dynamic would have important implications for the social network theory of homophily, which suggests that people relate to others who are more like them (Blau 1977). In traditional networks, people progress from status-based to values-based homophily, initially relating to one another through readily identifiable similarities and then later relating through shared interests or beliefs (Lazarsfeld and Merton 1954; McPherson et al. 2001). The ability to search content might reverse this process; users find and relate to others on the basis of common interests first, avoiding the initial relational interactions that would normally establish and identify common interests. This dynamic might be reinforced if users also break connections with others who do not provide valuable content. The result may be that even if social media networks initially reflect offline social networks (boyd and Ellison 2007), they may evolve into a more intentional resource access structure that bears little resemblance to offline social networks (Kwak et al. 2010).

Such an evolution might further exacerbate performance variation among users on a platform due to resource access. SNA theories argue that networks organize around nodes that provide the most valuable information, optimizing their ability to access information (Perry-Smith and Shalley 2003). Some users may employ content access mechanisms to optimize access to certain resources, resulting in access to greater depth of content at the detriment of its breadth (Katila and Ahuja 2002). Other users may employ access mechanisms to broaden their access to resources. Which type of network will allow users to perform better will likely depend on the task and environment of the network, among a multitude of other factors. In short, the relationship between search mechanisms and relational ties as means for accessing resources in social media networks is complex, resulting in considerable performance variation over time among users, depending on how they use these features independently and in relation to their network connections.

RQ9: How do people use various content access mechanisms (e.g., keyword search, information streams), independently and in conjunction with their relational ties, to facilitate access to different types of digital resources on a social media platform, and how does this use result in performance variation among users?

Privacy

Most social media platforms provide some controls to users so they can protect information from others on a platform (Gross and Acquisti 2005). A simplistic conclusion may be that greater privacy protections limit the resources available to a user, with a negative effect on performance outcomes. Yet the way users employ these features may have more complex effects on resource access and the ability to convert it into improved performance. Resource access in a social media network is a function of the value of the resources contributed and the user's ability to access those resources efficiently. Because they potentially affect both the supply and the demand aspects of the equation, it is not clear whether the use of privacy protections has a net positive or negative effect on resource access. Paradoxically, it is possible that privacy protections could actually increase overall resource access on a platform.

On the supply side, privacy settings may influence a user's willingness to contribute content to social media networks. Considerable research has examined why people contribute content to online communities or networks (Constant et al. 1994; Wasko and Faraj 2000)—mostly by examining content contributed in response to a request from others or that is available to all members of the network. People contribute content proactively for various reasons, which may differ from the reasons cited to explain information content contributed in response to specific requests (Constant et al. 1996; Wasko and Faraj 2005). A user's willingness to contribute in social media networks depends somewhat on the audience he or she believes exists for that content, and privacy settings change the nature and scope of the audience for contributions. For example, stronger privacy settings may encourage users to contribute more personal content to social media networks in certain conditions, because they know the content will be viewed by only a small set of others (Joinson 2008). In contrast, users may be more willing to contribute other types of content if they know there will be a large audience for it (Zhang and Zhu 2011).

On the demand side, the amount of content a person can access depends on the privacy settings of his or her network contacts, such that the user has very little control. A social media network allows access to valuable resources only if the members of the user's network allow it. Economics may suggest that this type of setting is ripe for free-riding, such that rational actors consume but do not contribute to the network; people also may be reluctant to contribute content if it makes them less valuable to the network or their organization (Griffith et al. 2003). If so, people tend toward direct reciprocity relationships (Faraj and Johnson 2011) and adjust their privacy settings to match the privacy settings of their connections. This tendency may result in network clusters of people of similar, more or less permissive privacy settings.

It may not be the average level of privacy settings that determines the overall resource access, however, but the distribution or variance among privacy settings that matter most (Zheleva and Getoor 2009). Burton-Jones and Gallivan (2007) note many different ways in which information systems use may be distributed across a group. For example, the overall content available through a network may depend more on the weakest link, rather than average levels of privacy settings. Social network theory provides some support for such hypotheses. If a user shares content with his or her connections, the recipient may intentionally or unintentionally share that content with others, by sharing or forwarding particular content (e.g., retweeting). Since many network structures tend toward transitivity or closure (i.e., people tend to share mutual friends; Heider 1946), this forwarding activity may mean the contributed content ultimately is indirectly available through the network to contacts blocked directly by the original contributor. Thus, privacy settings that restrict information shared with particular nodes or ties may be ineffective in networks in which members of a network can share content with the very people the contributor protected it from.

RQ10: How does the use of privacy features by a user and his or her network contacts facilitate access to digital resources on a social media platform, and how does this use result in performance variation among users?

Discussion and Conclusion

This paper offers a framework and research agenda to highlight novel and distinctive theoretical issues raised by social media and to facilitate IS research on social media networks. We examine the theoretical implications of a core set of social media features for four canonical SNA research streams that mark organizational research. We also identify four points of intersection at which the unique features of social media plat-

Table 8. Summary of Key Research Questions

	Structure	Content
Social Homogeneity Induced by Platform	• How do different types of ties (e.g. proximities, relations, interactions, flows), individually and in combination, affect users' networking behavior and shape the formation and characteristics of social media networks? • How do the features of relational ties (e.g., symmetry, allowable number) affect users' networking behavior and shape the formation and characteristics of social media networks? • What tie features are missing from social media platforms (e.g., strength, affect)? How might these features affect users' networking behavior and shape the formation and characteristics of social media networks?	• How do the features of the user profile (e.g., content type, digital trace, third-party contributions) affect users' behavior and influence the way content spreads across a social media network? • How does the correspondence between the digital profile and the user (e.g., authenticity, modality) affect users' behavior and influence how content spreads across the network?
Performance Variation from User Behavior	• How do people use information about the network structure provided by social media platforms to develop structural capital, and how does this use result in performance variation between users? • How do third parties use information about the network structure provided by social media platforms to develop structural capital, and how does this use result in performance variation between users? • How and why do people use (or not use) computer-aided networking recommendations to develop structural capital, and how does this use result in performance variation between users?	• How do people use various content access mechanisms (e.g., keyword search, information streams), independently and in conjunction with their relational ties, to facilitate access to different types of digital resources on a social media platform, and how does this use result in performance variation among users? • How does the use of privacy features by a user and his or her network contacts facilitate access to digital resources on a social media platform, and how does this use result in performance variation among users?

forms challenge the assumptions of and raise interesting research implications for theories and methods associated with SNA. We explored each implication in depth and articulated a series of broad, novel, theoretically significant research questions that suggest a robust agenda for investigating the distinct aspects of social media networks. We summarize these questions in Table 8.

We argue that social media networks have two primary implications for theories associated with social networks in terms of the mechanisms by which networks provide structural and informational value. First, social media introduces questions of platform design into SNA. Platform designers have considerable control over how to implement the characteristics of the nodes and ties on a particular social media platform, providing decisions about the network environment that are largely absent from offline networks. These design decisions will homogenize user behavior in common ways and likely will have profound implications for the formation and outcomes of the networks that emerge on particular social media platforms. Questions of platform design will become increasingly important as organizations seek to employ social media networks for various purposes, such as problem solving or intra-organizational knowledge management, since different technical features may be more conducive to cultivating networks with different objectives.

Second, social media provide users with capabilities that they do not possess in traditional offline social networks, such as visualizing network structure and searching for content in a network without using relational ties. Each user is likely to employ these capabilities differently from other users, introducing considerable variation in outcomes among users of the same platform. Users are also likely to react to the use of these capabilities by others, so these novel capabilities are likely to introduce complex dynamics that inform how and why users connect with others and share content with them. These dynamics are not likely to be explained by traditional social network theories formulated for networks in which users do not possess these capabilities. Questions of user behavior also become more important as social media networks become more ubiquitous and provide users with greater control over their networking experience.

We believe that our paper makes a number of important contributions to both research and practice. The primary

contribution of this paper is to articulate a vision for and a roadmap of the productive places for researchers to begin looking for and testing fundamental theoretical differences introduced by social media. The degree to which new social media technologies differ from traditional computer-mediated communication technologies and offline social networks, however, is ultimately an empirical question. If the premise of our paper is borne out, the differences theorized in this paper will be supported by future studies that address the research questions we articulate here. If it is not, the future empirical research addressing these questions will find that social media networks will behave the same as established in earlier studies of traditional social networks and collaboration technologies. Even if future empirical findings do not support all of the propositions embedded in our research questions, this paper will still contribute to the literature by facilitating deeper insight about the phenomenon of social media generally. The empirical research encouraged by this paper will help researchers know which theories from previous literature can be used to study social media networks and which aspects or applications of social media require additional theorizing.

We also hope this paper will facilitate the conduct and publication for such future empirical research on social media networks by providing a framework and language to begin thinking about, discussing, and evaluating empirical research on social media. Given the speed and scope of social media adoption, we believe it is an important phenomenon that merits considerable research across multiple organizational disciplines. Yet, our experience as authors, reviewers, and editors suggests that much of this important research is slowed in the publications pipeline as a result of few agreed upon ways in the academy to conceptualize and articulate the theoretical differences associated with social media. We hope that this paper provides the groundwork for future research and its timely publication, including research involving social media features that are yet to emerge. The framework presented here can serve as a model for conceptualizing how these new features may affect organizational theory and research.

While we hope that researchers investigate the specific questions presented here, another contribution of this article is to encourage IS researchers to think critically when adopting social network theories and methods for studying social media networks. We encourage future researchers not just to apply social network theories (or any other theories) blindly to social media, but to carefully consider whether the features of these technologies conform to the assumptions on which these theories are based. Some research has likely appropriated the methods and theories of SNA without critically considering whether and how the methods apply to the particular field of investigation (Kilduff et al. 2006). Similar adoption practices would be particularly problematic for social media researchers, because the features of social media platforms undermine many assumptions on which the theories and methods of SNA rest. Failing to account for these differences may lead researchers to erroneous conclusions. Yet the differences also provide a striking opportunity for IS researchers: As a field that investigates relationships between IT features and organizational impacts (e.g., Bostrom and Heinen 1977), the IS discipline seems uniquely suited to appreciate, identify, and investigate the differences introduced by social media.

Although we have focused primarily on the organizational impact of social media technologies, they clearly affect business and society in various ways that we do not address in this paper. People today can use social media to organize in ways that were difficult, if not impossible, just a few years ago, which has substantial implications for business, government, and society. In previous generations, IT was so expensive that only large organizations had the resources to implement and use it strategically. As the price of IT has dropped, people across the world, including in developing countries, have gained access to its power. The ubiquity of social media technologies grants customers increased bargaining power by providing them forums for organizing and sharing information (Porter 1980). The changed boundaries of companies allow communications among people outside the company through web-based social media platforms that cannot be controlled by the firm (Kane et al. 2009).

The concomitant widespread adoption of mobile technologies will also continue to influence and increase the impact of social media networks on increasing aspects of society. We have addressed a subset of these questions with our focus on organizational implications of social media, but we believe that aspects of our model are applicable to social media research in other fields as well. We hope that researchers in other disciplines will be able to use the broad outline of this framework to begin thinking about how to shape their own research agendas. We believe such a multidisciplinary approach is important, because it is quite possible that, despite the rapid and widespread adoption of social media technologies in recent years, the most significant impact and implications of social media on business and society are still to come.

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